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Impact of the service sector on the creation of companies in Poland

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Abstract

This paper's aim is to analyze the role of the service sector in creating companies from different industries. This paper is one of the first to contribute to revealing mechanisms of company creation in the Polish economy through utilizing association rule mining to find patterns in relationships between development paths of industries. The study's results reveal the complexity of the processes of creating new companies and the huge impact of the service sector on businesses creation. In addition, the study identifies the rules governing the creation of service companies and reveals the irrelevancy of urbanization economies.

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Keywords: service sector; company creation; development paths; regional development; urbanization economies; data mining; association rules; Apriori algorithms

1. Introduction

For many years, the service sector has been considered a little-understood part of the economy and thus a secondary force of regional development, although since the 1970s, its importance in economy renewals has grown (Begg 1993; Button & Pentecost 1993). Recently, there has been rapid growth of the service sector in the economies of many geographical regions (Strambach 2008), and thus the progressive specialization of the service industries is noticeable, particularly that of knowledge-intensive services (KISs). In fact, these regions have achieved their highest-ever levels of gross domestic product (GDP) per capita (Pylak 2015). The shift in the structure of the regional economies reveals that growth in the service sector may be the main regional development factor (Goe 1990). Although the literature on the service sector focuses on its impact on regional development, little has been said about the mechanisms driving the change in the development paths of various industries. This paper

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addresses this gap by finding patterns in development paths' coexistence, with particular attention given to the impact of the service sector on the creation of these paths.

This paper is one of the first to contribute to revealing the mechanisms of new business creation in the Polish economy. The value of this research lies in its level of analysis (community level), industrial perspective (46 service industries out of 86 industries in the economy) and the various development opportunities taken into account (including creation, extension, stagnation and shrinkage). Combined, these elements have the potential to reveal the role of each service industry in changing the development paths of other industries.

The paper is structured as follows: The next section explores and clarifies the theoretical foundations of service-sector performance and its role in regional growth. The third section lays out the empirical design of the study, including the general approach, hypotheses, preparation of data and selection of the research method. The fourth section presents and discusses the empirical results of the analysis, including the association rules of development paths in various industries and visualizations of these rules, and the fifth offers a conclusion.

2. The role of the service sector in regional growth

The service sector—both as a whole and where only KISs are concerned (Pylak & Majerek 2014b)—has a positive impact on GDP per capita and gross value added (GVA) in different regions (Pylak & Majerek 2014c). The service sector has a huge impact on regional development and job creation through providing 1) personal services to local inhabitants; 2) exporting and import-substituting services, especially producer services and 3) a wide range of business services that increase the competitiveness of a region and its business climate and thus may attract investors from outside of the region (Begg 1993). The second and third issues are obviously related to the manufacturing sector's willingness to, for example, outsource some services such as scientific, research and development services (Consoli & Elche 2014). However, the service sector certainly plays a crucial role in enabling and facilitating the functioning of every company, including service providers because the majority of service providers also need other services to function, such as accountancy, banking, real estate, information and communication. Clearly, companies in every industry and sector, including the service sector itself, rely on service companies to supply needed functions.

Although the growth of the service sector is primarily the result of the level of individual consumption per capita (Bottazzi & Gragnolati 2015) and the demand from the manufacturing sector, the service sector itself is demanding additional producer services to a greater extent than the manufacturing sector (Goe 1990). The demand for services may lead to the creation of service providers, and the ubiquity of service providers in an area can induce the creation of other companies that are eager to have quick access to a wide range of services (Begg 1993). Therefore, the service sector may play a crucial role in the development of companies in an entire economy via a unique development loop. The service sector may also influence the development of companies through increasing productivity and added value. Thanks to highly educated and experienced employees with certain cognitive skills, service companies are increasing their productivity (Backman 2014). Also, innovations in the service sector play a crucial role in increasing both their productivity levels and economic growth through innovation expenditures and innovative activities in general (Cainelli et al. 2004). At the same time, the service sector may have various effects on other companies' innovations (Djellal et al. 2013) because the service sector acts as a knowledge carrier, producer and mediator between industries. In particular, KISs are able to convert knowledge from one context to another, facilitating the diffusion of tacit knowledge in the economy.

The process of knowledge spillovers is enabled through companies' providing services not limited to one sector. Service companies are flexible as far as their suppliers and clients are concerned, and when providing services to both individual and corporate customers, they do not focus on specific industries or characteristics. This was confirmed in trade industries, including wholesale and retail trades, and also in membership organizations, health, social work, and education market services in France (Combes 2000). Therefore, the service sector may contribute to creating new regional development paths involving very diverse knowledge (Strambach 2008). The process of absorption, transformation and then transfer of tacit knowledge is usually made possible through human interaction (Backman 2014), so it may be facilitated in urban areas where the density of population is high. Indeed, many service industries act in urban areas that provide a sufficient level of density and diversity (Backman 2014).

3. Empirical design

3.1. General approach and hypotheses

We expect that service industries are engaged in the process of company creation to a greater extent than other industries because the majority of businesses need services, which induces the creation of service providers (Begg 1993). In addition, the abovementioned majority of businesses also consist of other service companies, thus these firms may take part as both creators and creatures of the process. Selling services usually require spatial proximity between provider and client, although this barrier has been overcome for several industries in recent years through various new communication channels (Blind & Jungmittag 2004). Thus, it is more suitable to analyze interactions between the service sector and other companies at the lowest level, namely community level (see for example Button & Pentecost 1993), where the market proximity is the closest and direct connections can be seen.

We also expect that larger markets located in urban areas are facilitating knowledge spillovers, and thus these areas may have greater impact on service-sector companies and vice versa because of the increased number of face-to-face interactions required in providing services (Backman 2014). In addition, infrastructural services can be provided more easily and cheaply in urban areas because installation costs are spread over a larger number of users than in non-urban areas; this was confirmed by Italian companies (Bottazzi & Gragnolati 2015). Thus, the service sector, in particular less knowledge-intensive services (LKISs), is influencing growth through urbanization economies (Combes 2000), especially in less-developed regions (Pylak & Majerek 2014a). This may mean that service industries have various interactions with other service providers, acting as both suppliers and clients, and thus their business networks may be extremely wide.

Interestingly, it has been shown that in Western Germany, spatial structures support the establishment of new service companies but then eventually limit their survival (Brixy & Grotz 2007) through competitive pressure in the sector. This may mean that service industries may decline in a long period of time. Thus, it is important to analyze changes in the number of service companies over time to identify these phenomena. Based on the abovementioned assumptions, we formed the following hypotheses: *Hypothesis 1a. The service sector plays a crucial role in the creation of companies.* The hypothesis will be confirmed if service industries are present in the creation processes to a greater extent than other industries. According to Goe (1990), we may narrow our analysis to the service sector and hypothesize that *(hypothesis 1b) The service sector influences the creation of companies in service industries to a greater extent than the other industries do.* This hypothesis will be confirmed if companies in service industries are created mainly as a result of increasing demands from service providers. *Hypothesis 2. Urban areas play a crucial role in facilitating company creation through allowing spatial proximity*. Urban economies may benefit the service sector in facilitating connections to its customers.

3.2. Preparation of data

To achieve the abovementioned purposes of the research, we analyzed changes in the number of companies in the 2,509 communities that comprise Poland. We took data for 86 industries, including 46 service industries, for the years 2009 to 2013, which is the longest period available after the change in the Statistical Classification of Economic Activities in the European Community (NACE) codes. Fortunately, it is a sufficient period to analyze localization economies and nearly sufficient to analyze urbanization economies; these analyses need four and eight years respectively to show the impact of the economies (Henderson 1997).

Taking into account the number of companies at the beginning of the period and the change in companies during the period, following Isaksen & Trippl's (2014) method we extracted five possible development paths of each industry in a given community: 1) no industry if both the number of companies in 2009 and the change are equal to zero; 2) path creation if there were no companies in 2009 but there were some in 2013 (Martin & Sunley 2006); 3) path shrinkage, which means the number of companies in the existing industry decreased from 2009 to 2013; 4) path stagnation, which means the number of companies in the existing industry remained the same; and 5) path extension which means there was growth in the number of firms in the existing industry (Hassink 2010).

Assuming that **Γ** is the matrix of development paths in communities, and $X = \{\chi_1, \chi_2, \chi_3, \ldots, \chi_m\}$, m = 2,509 and $\Phi = \{\phi_1, \phi_2, \phi_3, \ldots, \phi_n\}$, n = 86 are the set of communities and the set of industries, respectively, the matrix is presented in equation 1:

$$\mathbf{\Gamma} = \begin{bmatrix} \varphi_{11}, & \varphi_{12}, & \ldots, & \varphi_{1n} \\ \varphi_{21}, & \varphi_{22}, & \ldots, & \varphi_{2n} \\ & & \vdots & \\ \varphi_{m1}, & \varphi_{m2}, & \ldots, & \varphi_{mn} \end{bmatrix} \tag{1}$$

Each $\varphi_{mn} = \{1,2,3,4,5\}$ stands for a development path in community *m* and industry *n*. Additionally, according to hypothesis 2, we need to add parameter $T = \{\tau_1, \tau_2, \tau_3, \ldots, \tau_m\}$ for the type of the community. We distinguished 1) urban communities, 2) rural communities and 3) urban and rural communities in accordance with the assignment of the communities in the official statistics.

3.3. Selection of the research method

Data gathered for this survey are characterized by a large number of communities and industries and five possible development paths of each industry (see section 3.2), although we decided to exclude path 1 (no industry) in light of the research purpose. Finding frequent item sets, repeating patterns of coexistence and dynamic changes (through different paths) and also interesting and frequent causal sequences between changing paths of industries development requires sophisticated tools. We implemented association rule mining, which allowed us to build dynamic, non-linear models for complex, unstructured data sets (Steinbach et al. 2007) and is widely used in different economic domains, including market basket analysis, human resource management, organizational behavior, entrepreneurs' identity, strategic management (Aguinis et al. 2013), logistic distribution (Li & Wang 2008) and technological intelligence (Newman et al. 2014) to indicate determinants of unemployment (McArthur et al. 2012), enterprise growth (Antlova et al. 2011), crises (Minoiu et al. 2015) and even patterns in acts of corruption (Begen & Tverdokhlib 2011).

The aim of the association analysis is to find relationships (so-called association rules) between different development paths in industries within communities, which requires specific dataset preparation. Because in the Apriori algorithm (Cakir & Aras 2012) only binary values may be used, we converted matrix **Γ** into **Γ'** (see equation 2), in which every type of community and development path in each industry is represented by one if the type or development path exists in the given community and zero if it does not.

$$\mathbf{\Gamma'} = \begin{bmatrix} \tau_1{=}1, & \tau_1{=}2, & \tau_1{=}3, & \phi_{11}{=}2, & \phi_{11}{=}3, & \phi_{11}{=}4, & \phi_{11}{=}5, & \ldots, & \phi_{1n}{=}2, & \phi_{1n}{=}3, & \phi_{1n}{=}4, & \phi_{1n}{=}5 \\ \tau_2{=}1, & \tau_2{=}2, & \tau_2{=}3, & \phi_{21}{=}2, & \phi_{21}{=}3, & \phi_{21}{=}4, & \phi_{21}{=}5, & \ldots, & \phi_{2n}{=}2, & \phi_{2n}{=}3, & \phi_{2n}{=}4, & \phi_{2n}{=}5 \\ & & & & & & & \vdots & & & & \\ \tau_m{=}1, & \tau_m{=}2, & \tau_m{=}3, & \phi_{m1}{=}2, & \phi_{m1}{=}3, & \phi_{m1}{=}4, & \phi_{m1}{=}5, & \ldots, & \phi_{mn}{=}2, & \phi_{mn}{=}3, & \phi_{mn}{=}4, & \phi_{mn}{=}5 \end{bmatrix} \tag{2}$$

In this equation, $\tau_m = 1,2,3$ means community *m* is an urban, rural or urban and rural area, respectively; $\phi_{mn} = 2$ stands for path creation in industry *n* in community *m*, and similarly 3 stands for path shrinkage, 4 stands for path stagnation and 5 stands for path extension. An association rule is an implication expression of the form $LHS \Rightarrow RHS$, where *LHS (left-hand-side)* and *RHS (right-hand-side)* are disjoint itemsets of development paths in industries standing for *antecedents* and *consequents*, respectively; thus $LHS, RHS \subseteq \Gamma'$ and $LHS \cap RHS = \varnothing$. The strength of each association rule can be measured by its *support* and *confidence*. *Support* $s(LHS \Rightarrow RHS)$ of itemsets *LHS* and *RHS* is defined as the proportion of communities which contain $LHS \cup RHS$ in all communities, and the *confidence* of a rule $LHS \Rightarrow RHS$ is defined as $c(LHS \Rightarrow RHS) = s(LHS \cup RHS) / s(LHS)$. Because some development paths or industries might not be ubiquitous but are still important for the creation of new companies, we are looking for rules that are more likely satisfied but do not necessarily occur frequently in the economy. Thus, we assume that

$s(LHS \cup RHS) \geq \sigma$ and $c(LHS \Rightarrow RHS) \geq \delta$, where σ is the minimum *support* equal to 0.1 and δ is the minimum *confidence* equal to 0.9. In addition, we used also *lift* measure, which can be defined as $lift\ (LHS \Rightarrow RHS) = s(LHS \cup RHS) / (s(LHS)\ s(RHS))$. *Lift* values greater than 1 indicate stronger associations. We used the *arules* add-on package to *R ecosystem* (Hahsler et al. 2011), which enables easy mining and visualizing of complicated rules.

Then we exported the rules of each industry to a *Gephi* environment to draw graphs. *Gephi* enables us to show extremely complex networks in a simple way by implementing a *ForceAtlas2* layout algorithm with dissuaded hubs (Jacomy et al. 2014). Despite this, the diagrams are easy to understand only for smaller networks.

4. Empirical results and discussion

4.1. The service sector in the process of company creation

Association analysis extracted over 645,000 association rules from the **Γ'** item set. It revealed that the development paths of service industries have extremely complex interconnections with the development paths of other industries. Their general characteristics are presented in Appendix A. We can observe that the most common development paths influencing company creation occurred in service industries and were limited only to path extensions. Other paths occurred very rarely and applied to only a low percentage of the rules. Average *support* of the rules ranges from 0.106 to 0.123, which means rules usually appear in an average of 11% to 12% of analyzed communities. The average *confidence* of the rules is high, ranging from 0.916 to 0.969, which means *consequents* are true when *antecedents* are true in 92% to 97% of cases. Also, the average *lift* is high and ranges from 1.009 to 1.356, which indicates strong associations of *antecedents* with *consequents*.

The most ubiquitous services industries in the association rules include knowledge-intensive market services (M.69. Legal and accounting activities; M.71. Architectural and engineering activities, technical testing; M.70. Activities of head offices; management consultancy activities; M.73. Advertising and market research), other KISs (Q.86. Human health activities; P.85. Education; R.93. Sports activities and amusement and recreation activities), high-tech KISs (J.62. Computer programming, consultancy and related activities) and LKISs (G.45. Wholesale and retail trade and repair of motor vehicles and motorcycles; L.68. Real estate activities; S.94. Activities of membership organizations; N.81. Services to buildings and landscape activities; S.96. Other personal service activities; T.97. Activities of households as employers of domestic personnel; T.98. Undifferentiated goods and services; G.46. Wholesale trade except of motor vehicles and motorcycles; N.82. Office administrative, office support and other business support activities). Each service industry appears in at least every fifth or even every third rule.

Interestingly, the rules are also co-created by many other industries; for example, 150 industries co-created rules with the education industry (P.85), which is the highest number of industries co-existing in the rules. We can see that the number of occurrences of a given industry in the rules is not proportional to the number of industries co-creating these rules. Hence, we can conclude that the industries have different degrees of relationships, and the networks they create have different scopes and ranges. In addition, the industries that appear in the largest number of rules consist of more than half of the service industries and only one-third of the manufacturing industries. We noticed that if an industry co-creates a smaller number of rules, the share of service industries increases in its network and the share of manufacturing industries decreases. This phenomenon is exemplified in Fig. 1, which illustrates two different industries in this context. We can see that in M.69 = 5 (Fig. 1a), 51% of industries co-existing in rules are from the service sector and 32% are from manufacturing sector; however, the qualitative (visible) impact of the service industries is much bigger than the quantitative, which means the interconnections of these industries are more dense. Similarly, in J.61 = 5 (Fig. 1b), the qualitative proportion of the service industries is equal to 72%, while manufacturing is only 16%; the latter is hardly visible on the graph.

We also analyzed the *consequents (RHS)* of the rules. *Consequents* refer to the paths in industries that are created through the occurrence of given structure of paths in other industries *(antecedents)*. Thus, *consequents* indicate ways in which companies are more likely to be launched and why. Our analysis revealed only nine industries in which companies were created (see Appendix A). No other paths are supported through the revealed rules. Out of these nine industries, eight belong to the service sector, and one belongs to the construction sector. Five service industries are KISs, including one high-tech KIS. Therefore, this provides strong evidence for the significant role of the service

sector in creating service-providing companies. The majority of the rules address creating member organizations *(S.94)*, human health *(Q.86)* and education *(P.85)* companies and, to lesser extent, legal and accounting activities *(M.69)*, wholesale and retail trade and repair of motor vehicles and motorcycles *(P.45)* and real estate activities *(L.68)*. Also, some rules lead to the creation of companies in high-tech KISs, which involve computer programming, consultancy and related activities *(J.62)*.

(a) Path extension in M.69. Legal and accounting activities (b) Path extension in J.61. Telecommunications

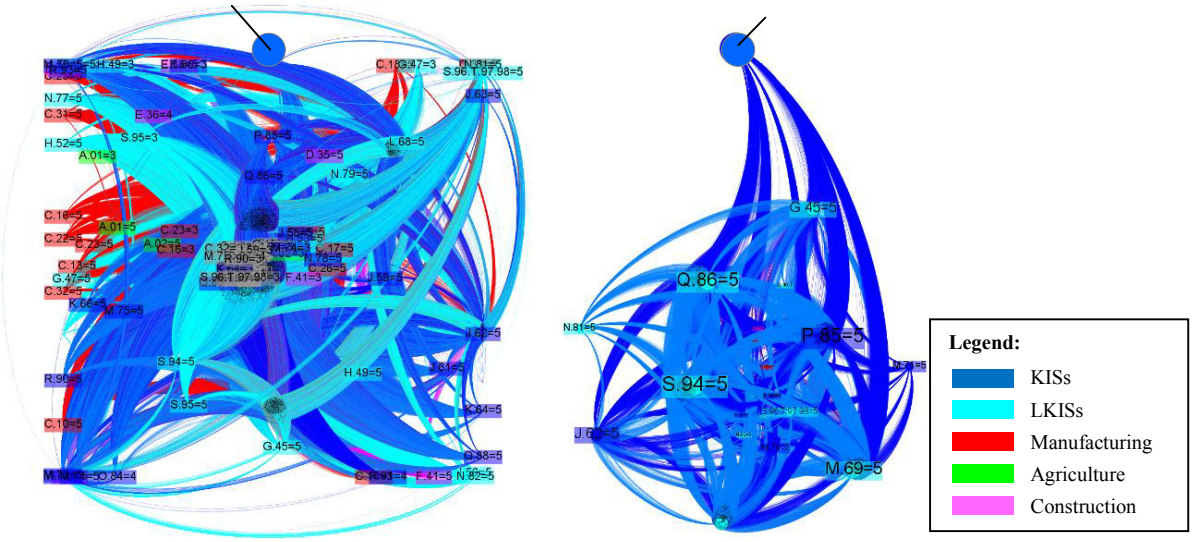

Fig. 1. Gephi visualizations of association rules of two exemplifying industries: (a) M69 = 5; (b) J61 = 5. Industry abbreviations are defined in Appendix A; '=3' means path shrinkage, '=4' means path stagnation and '=5' means path extension.

Notably, the industries that are the most significantly represented in the *antecedents* are also the only *consequents*. The exception is specialized construction activities *(F.43)*, which belong to the construction sector. This conclusion proves that service companies from specific industries are created mainly because of increasing demand from service providers, which is also confirmed in the literature (Goe 1990). Therefore, we may say service industries are driving their development and mutually reinforcing the creation of new service companies. This may prove the continuing process of regional specialization in service industries, including KISs, described in other papers (see for example Pylak 2015). However, we cannot forget that manufacturing and other industries also have a role in the process of service company creation. Lack of manufacturing or other industries in *ascendants* does not mean these companies are not created. They are likely created through rules with less *support* or *confidence,* which means the rules occur in communities or are satisfied to a lesser extent. This means the processes of creating non-service companies are less certain than processes of creating service companies.

4.2. Agglomeration effects in the process of company creation

The findings derived from the association rules in section 4.1 are extremely important for understanding the process of new business creation. The literature review suggests urbanization economies may facilitate companies' provision of services and thus may better support company creation through spatial proximity. Therefore, we added an additional variable to the association rules to find out if the type of community (urban, urban and rural or rural areas) plays a significant role in the process of creating new businesses. The average characteristics of these rules are included in Appendix A, and the rules explaining the parameters of different community types are presented in Fig. 2.

The type of community was relevant only in 1.4% of the association rules, which means that in general it is not a significant factor in the process of new business creation. The majority of those rules affect rural areas because

rural communities are much more numerous than other communities. The rules in rural communities contain twice as many industries as those in urban and rural communities and seven times as many as those in urban areas.

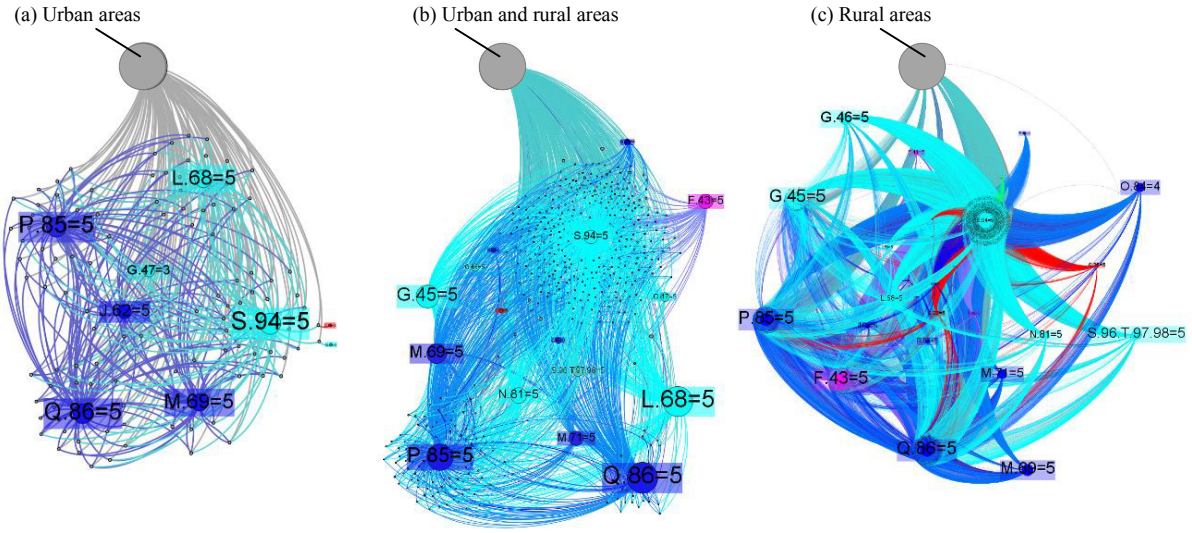

Fig. 2. Gephi visualizations of association rules dependent on various types of communities: (a) urban areas, (b) urban and rural areas and (c) rural areas. Industry abbreviations are defined in Appendix A; '=3' means path shrinkage, '=4' means path stagnation and '=5' means path extension. Colors are defined in the legend of Fig. 1.

However, urban areas contain 89% of the different types of service industries, in contrast with urban and rural areas, which contain 72%, and rural areas, which contain 66%. What is more, rules containing urban community parameters are more *confident* (0.954 in contrast to 0.933 in rural areas) and more *lifted* (1.289 in contrast to 1.085 in urban and rural areas and 1.066 in rural areas). Nevertheless, there is no evidence that urban areas influence new business creation to a greater extent than other areas.

5. Conclusion

The aim of the paper was to analyze the role of the service sector in creating companies from different industries in Poland. To achieve this aim we established three hypotheses suggesting that the service sector had a greater share in the process of setting up businesses than other sectors in general, including the establishment of service companies, as well as that the effects of urbanization had a significant role in this process.

The findings revealed that the processes of new business creation are very complex and the association rules accompanying these processes are numerous, diverse and extensive. First, the service sector is the most visible creator of association rules where separate industries are concerned and where a proportion of all industries creating rules in general are concerned as well. For the majority of the rules, path extensions are crucial, and these kind of paths are extremely important for business creation. However, path extensions in service industries have to co-exist with path extensions in non-service industries, although other industries are in the minority. Therefore, *hypothesis 1a* is fully confirmed.

Interestingly, all the rules being investigated lead only to the creation of companies from eight service industries and one construction industry; no rule lead to the creation of manufacturing companies. This means service industries influence growth in other service industries; however, according to *hypothesis 1a*, there is still a necessity of involving industries from the manufacturing, building and agriculture sectors in the process, to a lesser extent. Thus, *hypothesis 1b* is fully confirmed.

In contrast, *hypothesis 2* is not confirmed because urban areas are not influencing growth to a greater extent than other areas, although some strong associations can be found. Thus, spatial proximity is not crucial.

Appendix A. Characterisations of the most common rules and industries with the greatest interrelations in creating companies

NACE code and industry name		Sector/knowledge intensity	Path	Development paths in industries as antecedents (LHS)…			…and as consequents (RHS)		Average characteristics of rules		
				Number of rules with given path in industry	Share in all rules	Number of paths in industries coexisting in rules	Number of rules with given path in industry	Share in all rules	Average support	Average confidence	Average lift
M.69	Legal and accounting activities	KIS market services	extension	196,292	30.4	117	54,903	8.5	0.122	0.952	1.192
Q.86	Human health activities	Other KIS	extension	184,542	28.6	148	149,267	23.1	0.122	0.949	1.206
P.85	Education	Other KIS	extension	184,368	28.6	150	143,957	22.3	0.122	0.950	1.223
G.45	Wholesale and retail trade and repair of motor vehicles and motorcycles	LKIS	extension	180,354	27.9	137	54,646	8.5	0.122	0.950	1.204
L.68	Real estate activities	LKIS	extension	179,303	27.8	128	26,713	4.1	0.121	0.951	1.211
S.94	Activities of membership organizations	LKIS	extension	174,361	27.0	103	206,984	32.1	0.121	0.935	1.260
J.62	Computer programming, consultancy and related activities	High-tech KIS	extension	171,177	26.5	92	8,009	1.2	0.120	0.952	1.236
M.71	Architectural and engineering activities; technical testing	KIS market services	extension	157,477	24.4	107	340	0.1	0.121	0.949	1.216
N.81	Services to buildings and landscape activities	LKIS	extension	146,115	22.6	111	0	0.0	0.121	0.948	1.205
S.96	Other personal service activities	LKIS	extension	144,736	22.4	117	0	0.0	0.121	0.947	1.197
T.97	Activities of households as employers of domestic personnel										
T.98	Undifferentiated goods and services										
G.46	Wholesale trade, except of motor vehicles and motorcycles	LKIS	extension	122,084	18.9	102	0	0.0	0.121	0.947	1.187
F.43	Specialized construction activities	Other activities	extension	121,248	18.8	127	544	0.1	0.122	0.945	1.161
M.70	Activities of head offices; management consultancy activities	KIS market services	extension	106,504	16.5	73	0	0.0	0.118	0.950	1.271
R.93	Sports activities and amusement and recreation activities	Other KIS	extension	99,433	15.4	96	0	0.0	0.120	0.951	1.208
M.73	Advertising and market research	KIS market services	extension	99,352	15.4	77	0	0.0	0.118	0.951	1.263
C.33	Repair and installation of machinery and equipment	Medium-low-technology	extension	96,329	14.9	88	0	0.0	0.119	0.949	1.205
N.82	Office administrative, office support and other business support activities	LKIS	extension	81,489	12.6	75	0	0.0	0.117	0.951	1.261
C.25	Manufacture of fabricated metal products, except machinery and equipment	Medium-low-technology	extension	64,164	9.9	86	0	0.0	0.119	0.945	1.170
F.41	Construction of buildings	Other activities	extension	53,019	8.2	83	0	0.0	0.119	0.950	1.160
I.56	Food and beverage service activities	LKIS	extension	51,413	8.0	71	0	0.0	0.118	0.947	1.188
Q.88	Social work activities without accommodation	Other KIS	extension	50,070	7.8	75	0	0.0	0.116	0.952	1.244

M.74	Other professional, scientific and technical activities	KIS market services	extension	43,162	6.7	65	0	0.0	0.117	0.948	1.202
F.42	Civil engineering	Other activities	extension	42,481	6.6	76	0	0.0	0.119	0.949	1.161
C.10	Manufacture of food products	Low-technology	extension	39,283	6.1	74	0	0.0	0.117	0.949	1.191
C.31	Manufacture of furniture	Low-technology	extension	36,445	5.7	66	0	0.0	0.117	0.943	1.189
H.52	Warehousing and support activities for transportation	LKIS	extension	36,472	5.7	66	0	0.0	0.115	0.950	1.263
N.77	Rental and leasing activities	LKIS	extension	34,713	5.4	65	0	0.0	0.115	0.949	1.252
O.84	Public administration and defense; compulsory social security	Other KIS	stagnation	32,718	5.1	116	0	0.0	0.123	0.942	1.099
I.55	Accommodation	LKIS	extension	26,129	4.1	67	0	0.0	0.116	0.953	1.215
J.63	Information service activities	High-tech KIS	extension	22,630	3.5	53	0	0.0	0.113	0.958	1.343
G.47	Retail trade, except of motor vehicles and motorcycles	LKIS	shrinkage	21,641	3.4	104	0	0.0	0.120	0.946	1.121
H.49	Land transport and transport via pipelines	LKIS	shrinkage	20,984	3.3	86	0	0.0	0.118	0.948	1.153
K.64	Financial service activities, except insurance and pension funding	KIS financial services	extension	19,812	3.1	51	0	0.0	0.113	0.953	1.290
C.14	Manufacture of wearing apparel	Low-technology	shrinkage	18,844	2.9	74	0	0.0	0.117	0.948	1.187
R.90	Creative, arts and entertainment activities	Other KIS	extension	16,508	2.6	62	0	0.0	0.116	0.950	1.175
R.91	Libraries, archives, museums and other cultural activities	Other KIS	stagnation	15,716	2.4	87	0	0.0	0.122	0.938	1.081
C.16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Low-technology	extension	14,966	2.3	61	0	0.0	0.116	0.940	1.153
K.66	Activities auxiliary to financial services and insurance activities	KIS financial services	shrinkage	10,747	1.7	78	0	0.0	0.119	0.949	1.112
C.32	Other manufacturing	Low-technology	extension	9,665	1.5	50	0	0.0	0.114	0.951	1.210
E.38	Waste collection, treatment and disposal activities; materials recovery	Other activities	extension	9,394	1.5	46	0	0.0	0.113	0.955	1.269
J.61	Telecommunications	High-tech KIS	extension	8,950	1.4	43	0	0.0	0.112	0.956	1.296
C.22	Manufacture of rubber and plastic products	Medium-low-technology	extension	8,935	1.4	45	0	0.0	0.113	0.945	1.221
A.01	Crop and animal production, hunting and related service	Other activities	shrinkage	7,448	1.2	58	0	0.0	0.117	0.943	1.136
E.36	Water collection, treatment and supply	Other activities	stagnation	6,496	1.0	66	0	0.0	0.117	0.944	1.117
C.13	Manufacture of textiles	Low-technology	extension	5,842	0.9	41	0	0.0	0.112	0.953	1.263
…		…	…	…	…	…	…	…	…	…	…
Rural areas		Not applicable (N/A)	N/A	8,308	1.3	62	0	0.0	0.120	0.933	1.066
Urban and rural areas		N/A	N/A	427	0.1	36	0	0.0	0.115	0.953	1.085
Urban areas		N/A	N/A	107	0.0	9	0	0.0	0.107	0.954	1.289

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